Space Weather Forecast

Issued on Friday, 24 March 2023 at 13:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Further Minor/Moderate Geomagnetic Storms expected with a chance of Moderate storms on Days 1-2 (24-25 Mar). Daily Slight Chance of R1/R2 Radio Blackouts.

Solar Activity: Solar activity has been Low over the past 24 hours with occasional Common-Class flares. One sunspot in the southwest quadrant remains the largest and most complex region on the disc, and there are several new sunspots that have emerged or developed in the past 24-hours. However, most regions on the visible disc are small, weak and magnetically stable.

No Earth directed Coronal Mass Ejections have been observed in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind, has largely remained at slightly elevated levels, with brief peaks to elevated levels, the highest being 513 km/s at 23/1411 UTC. Otherwise, winds have shown a gradual decline to 401 km/s at 24/0917 UTC but since 24/0922 UTC have been showing a generally upward trend and are currently around 460 km/s. This is likely to be the result of a commencing connection to fast winds from a coronal hole.

The important north-south component of the solar wind has been predominantly negative, and mostly strongly negative from around 23/1650 UTC. Since 24/0737 UTC, the north-south component has fluctuated weakly.

The net result of the above solar wind measures saw Geomagnetic activity increased from Active (Kp4) to predominantly G1/Minor Storm to G2/Moderate storm (Kp 5-6). G3/Strong (Kp7) storm intervals were observed in the 23/1200-1500 UTC, 23/2100-2400UTC and 24/0000-0300 UTC intervals, and a G4/Severe storm interval observed 24/0300-0600 UTC.
Enhanced aurora was observed across Scotland, Northern Ireland and northern England with reports of visible aurora across parts of central and southern England.

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10MeV) as measured at GOES16 is at Background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Low Solar activity is expected, with a daily slight chance of isolated Moderate-class flares, mainly from the largest sunspot or from one of several returning regions due onto the visible disc from the far-side during the forecast period.

Solar Wind / Geomagnetic Activity: CME arrivals during 23 and 24 Mar are the most likely cause of the current enhanced geomagnetic activity. Fast solar winds from a coronal hole are forecast to arrive later Day 1. These combined effects are expected to maintain enhanced geomagnetic activity through most of the forecast period.

Initial G1-G2 Minor/Moderate geomagnetic storm conditions (Kp 5-6) are expected, these

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

gradually declining to Active to G1/Minor storm (Kp 4-5) conditions overnight and during Day 2 (25 Mar). There is a chance of an isolated G3/Strong storm interval due to the arrival of coronal hole fast winds. Geomagnetic activity is forecast to remain enhanced but with a gradual decline through Days 3-4 (26-27 Mar) to Quiet (Kp0-2) to Unsettled (Kp3).

Aurora may be visible on Days 1-2 (24-25 Mar) in parts of Scotland and Northern Ireland, with a chance of visible aurora across parts of northern England and North Wales should further G3/Strong storm intervals occur.

Energetic Particles / Solar Radiation: High energy (greater than 10MeV) proton flux is expected to continue at Background levels, with only a slight chance of further enhancements should any significant flares occur.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	100	70	40	10
Strong	G3	Yes	30	25	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	10	10	10	10
Very Active	R3 to R5 X	No	1	1	1	1

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	5	5	5	5
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2023. All Rights Reserved.